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| EXAMINER | |
|---|---|
| ALANKO, ANITA KAREN | |

| ART UNIT | PAPER NUMBER |
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| 1792 | |

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/689,042 | PATEL ET AL. | |
| | Examiner | Art Unit | |
| | Anita K. Alanko | 1792 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *06 August 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *8-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *8-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

### *Claim Rejections - 35 USC § 112*

Claims 8-19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The limitation "does not include abrasives" renders the claims indefinite since applicant is attempting to claim the invention by what it is not rather than by what it is. The limitation "in an absence of additionally added gases, feeding the feed gas through an ozone generator to generate ozone from the feed gas" is indefinite because it was an attempt to claim the invention by excluding what the inventors did not invent rather than distinctly and particularly pointing out what they did invent. In *re Schechter*, 205 F.2d 185, 98 USPQ 144 (CCPA 1953).

In addition, it is unclear if the removal step comprises the addition of abrasives since the removal step is not limited to only one composition because of the open "comprising" language.

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 8-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Scherber et al (US 5,858,813) in view of Wang et al (US 6,569,349 B1).

Scherber discloses a method comprising:

polishing (which comprises chemically etching) a TiW layer (col.10, lines 15-20) with a composition comprising water (col.6, lines 29-35) and from about 0.5%-15% by weight of

periodic acid (col.5, line 8, 32-34; the range encompasses the cited range) for a time and a temperature sufficient to cause the composition to remove at least a portion of the TiW alloy.

Scherber does not explicitly how the TiW barrier layer polishing step is used in combination with other steps, such as etching to form a residue and cleaning afterwards. However, these steps are suggested. For example, Scherber teaches that typically a first layer is planarized to expose the surface of a non-planar second layer (col.1, lines 35-37).

Wang teaches a method that gives more specific examples of the method disclosed by Scherber, i.e. CMP/polishing a copper layer selectively to a barrier/TiW layer (col.6, lines 49-52) with a first slurry (col.8, lines 9-13), and then removing the barrier/TiW layer with a second selective slurry (col.8, lines 20-25). This encompasses the cited steps of providing a substrate comprising an exposed TiW alloy layer and etching the TiW alloy by a method which results in formation of chemical etch residue. Residues are inherent in the etching process since the same method steps are conducted as in the instant invention.

It would have been obvious to one with ordinary skill in the art to provide a substrate comprising an exposed TiW alloy layer and etching the TiW alloy be a method which results in formation of etching residue in the method of Scherber because Wang teaches that this is a useful technique for planarizing substrates to enable ULSI.

Scherber does not explicitly disclose the pH of the composition, however since it comprises an acid, it is expected to be acidic. Wang also teaches that it is useful to vary the pH according to what is being polished (col.6, lines 10-17).

It would have also been obvious to use the composition at a pH of less than about 7 because Wang teaches that it is useful to vary the pH, and thus the pH appears to reflect a result-effective variable that can be optimized. See MPEP 2144.05 IIB.

Since the composition of Scherber is the same as the instant invention, the modified method of Scherber inherently has the same results of the removal rate of TiW alloy and residue thereof that is greater than a removal rate of Al, Cu or an AlCu alloy. This is also desired in order to preserve the integrity of the metal lines.

It would have been still further obvious to rinse the substrate in the modified method of Scherber in order to provide for a clean product, which improves the yield of the final product.

As to amended claims 8 and 14, Scherber discloses that composition may be packaged such that the periodic acid composition does not contain abrasives (the second package of the two-package system, col.6, lines 40-43).

As to claims 9-11, since the composition of Scherber is the same as in the instant invention, it is expected to have the same selectivity.

As to claims 12-13, it is well known that the temperature affects the reaction rate, therefore it would have been obvious to use the compositions at the temperatures cited because the temperature appears to reflect a result-effective variable that can be optimized. See MPEP 2144.05 IIB.

As to claim 14, Wang teaches that solutions that comprise hydrogen peroxide (col.5, lines 65-67) are conventional in CMP solutions. It would have been obvious to one with ordinary skill in the art to use hydrogen peroxide in the modified method of Scherer because Wang teaches that this is a useful, conventional solution for CMP.

As to claims 15-19, see the rejection of claims 9-13.

***Response to Amendment***

The claims are rejected under 35 USC 112 because of the new claim amendment "wherein said composition does not include abrasives." The claims remain rejected over Scherber et al and Wang et al. Scherber discloses that the composition may be packaged such that the abrasives are in a separate package from the chemical etchant, and thus reads on the claim, as broadly interpreted.

***Response to Arguments***

Applicant's arguments filed 8/6/07 have been fully considered but they are not persuasive. However, as discussed above, Scherber discloses that the composition may be packaged such that the abrasives are in a separate package from the chemical etchant, and thus reads on the claim as broadly interpreted.

***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anita K. Alanko whose telephone number is 571-272-1458. The examiner can normally be reached on Mon-Fri until 3:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Anita K Alanko/
Primary Examiner
Art Unit 1792